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GENERATING HYPOTHESES ABOUT THE FUNCTION OF STUDENT PROBLEM BEHAVIOR BY OBSERVING TEACHER BEHAVIOR

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We examined whether, as predicted by research on child effects, we could generate hypotheses about the function of student problem behavior by observing the amount of attention teachers provided to students. In the first phase of the study, we observed the amount of attention teachers distributed among small groups of students who exhibited problem behavior in individual or small-group instructional settings (problem behavior presumably maintained by attention or escape). Based on the amount of attention each student received, we generated hypotheses about the function of his or her problem behavior. In the second phase of the study, we determined the accuracy of these predictions by conducting a brief functional assessment with each student. Results confirmed that, for 14 of the 15 students, we were able to generate accurate hypotheses about the function of their problem behavior. These results suggest the potential efficacy of using the amount of attention teachers distribute among groups of students to generate empirically based hypotheses about the function of student problem behavior maintained by attention and/or escape. These results also illustrate the efficiency of this procedure; by observing teacher behavior, we were able to generate hypotheses about the function of problem behavior for several students at one time.

DESCRIPTORS: child effects, developmental disabilities, direct observation, functional analysis, children

Research suggests that functional assessment can improve the outcome of interventions for the problem behavior of persons with developmental disabilities (Carr, Robinson, Taylor, & Carlson, 1990; Durand, 1990; Iwata, Vollmer, & Zarcone, 1990; Mace, Lalli, & Lalli, 1991; Repp, Felce, & Barton, 1988). Recently, researchers have been concerned about the ecological validity or generalizability of experimental functional analysis (e.g., Sasso et al., 1992). Although an experimental analysis demonstrates causal relationships between environmental events and problem behavior in analogue situations, its results are valid only to the extent that the contingencies and stimuli in the analogue environment match those in the natural environment. If they do not match, an experimental functional analysis may identify functional relationships capable of operating in, but not actually operating in or generalizing to, the natural environment (Iwata et al., 1990; Mace & Lalli, 1991; Sasso et al., 1992).

In response to the generalizability problem inherent in experimental functional analysis, researchers have used descriptive analysis, which involves

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directly observing student problem behavior and its antecedents and consequences in the natural environment, to generate empirically based hypotheses about the naturally occurring variables that control student problem behavior (Bijou, Peterson, & Ault, 1968; Mace & Lalli, 1991; Mace et al., 1991; Sasso et al., 1992). An experimental analysis is then used to verify that those naturally occurring variables are functionally related to the problem behavior. Although descriptive and experimental data are not always consistent (Lerman & Iwata, 1993; Mace & Lalli, 1991), descriptive and experimental analyses have been used successfully in combination to treat problem behavior (Kern, Childs, Dunlap, Clarke, & Falk, 1994; Mace & Lalli, 1991; Sasso et al., 1992).

Another method of generating empirically based hypotheses about the naturally occurring variables that control student problem behavior is to observe teacher behavior directly. Research on child effects indicates that a child's problem behavior influences adults' interactions with the child (Anderson, Lytton, & Romney, 1986; Barkley & Cunningham, 1979; Bell & Harper, 1977). More specifically, studies suggest that student problem behavior influences the amount of attention teachers deliver to students. Carr, Taylor, and Robinson (1991) found that when students displayed problem behavior maintained by escape, teachers responded by interacting less frequently with these students. Taylor and Carr (1992) found that when students displayed problem behavior maintained by attention, teachers responded by interacting more frequently with these students. In other words, when students exhibited escape-maintained problem behavior, they received less attention than their peers (Carr et al., 1991); when students exhibited attention-maintained problem behavior, they received more attention than their peers (Taylor & Carr, 1992). These data suggest that by measuring the amount of attention teachers distribute among students, researchers may be able to generate empirically based hypotheses about the escape and attention-seeking functions of students' problem behavior.

We conducted a two-phase study to determine whether we could accurately generate empirically based hypotheses about the function of students' problem behavior by measuring the amount of attention teachers distributed among small groups of students. We believed that observing teacher behavior might be more efficient and require less expertise and fewer resources than descriptive analysis. We wanted to determine whether, by observing the behavior of one individual (the teacher), we could generate hypotheses about the behavior of several students (each student in the small group). Similarly, descriptive analyses have been criticized as labor intensive and, in part because of the number of categories of events that must be recorded, too complex to be used without technical expertise or extensive training (Luiselli, 1991). Observing and recording a single category of events (teacher attention) may be easier. By increasing the efficiency of direct observation and reducing the labor, resources, and expertise required to use it, we may increase its utility as a hypothesis-generating technique in natural settings.

In Phase 1 of our study, we observed the amount of attention teachers distributed among small groups of students who exhibited problem behavior in individual or small-group instructional settings. Based on this information, we generated hypotheses about the function of each student's problem behavior. In Phase 2, we conducted brief experimental functional analyses (based on the procedure described by Cooper, Wacker, Sasso, Reimers, & Donn, 1990) to identify the functional relationships between environmental events and students' problem behavior. Then we compared the results of Phase 2 to the predictions we made in Phase 1.

PHASE 1: DISTRIBUTION OF TEACHER ATTENTION AMONG STUDENTS

Method

Participants

Adults. Three female staff members at the students' school served as subjects: Two were special education teachers and 1 was a speech and language therapist. Their professional experience ranged from

1 to 8 years. All 3 subjects were familiar with applied behavior-analytic techniques such as differential attention, extinction, and reinforcement; as part of their daily routine teaching activities, the subjects used these techniques with the students in their classrooms. The subjects had frequent contact with the students who participated in this study before and during the study. The subjects were not familiar with the purpose of the study.

Students. Three female and 12 male students enrolled in a university-based special education program for children and adolescents with autism, developmental disabilities, and emotional disorders participated. Classroom teachers nominated students who, while in small-group or individual instructional settings, exhibited frequent (i.e., several episodes per instructional period) and severe (i.e., their behavior disrupted classroom activities, was potentially dangerous, or resulted in property destruction) problem behavior that was presumably maintained by attention or escape. Informed consent was obtained from the students' parents or guardians before the students were enrolled in the study. The students ranged in age from 3 years 2 months to 11 years 7 months. All of the students (except Jason) displayed delayed cognitive and receptive language skills, as measured by standardized tests. (Jason's mental and receptive language age scores exceeded his chronological age.) Independent of the present investigation, 9 of the students had received an educational classification of autism, and 6 had received a classification of emotional disturbance. The students exhibited a variety of problem behaviors, including self-stimulatory behavior, noncompliance, aggression, disrupting or destroying objects, and temper tantrums (defined as screaming and crying plus flailing or banging limbs or torso). The students are described in Table 1.

Setting and Materials

The study was conducted at the university-based program described above. Sessions were held in a classroom established for small-group instruction furnished with a large table, several chairs, wall decorations, and education and leisure materials. A videocamera was located in the corner of the room. The teacher sat at the table across from the students.

The teacher presented a total of three tasks in discrete-trial format to each student. The tasks were individually selected from each student's individual education plan (IEP). Examples included letter and number identification, sight vocabulary, math flashcard drills, expressive language tasks (labeling objects, verbal imitation), and prevocational tasks.

Data Collection

One category of teacher behavior, *attending,* was scored for any interval in which the teacher looked at, spoke to, touched, or communicated nonverbally with the target student. Teaching sessions were videotaped, and data were recorded continuously in 10-s partial-interval format from the tapes. An electronic interval marker signaled 10-s intervals on the videotapes via an automated voice and video display. The interval markers were not audible during the sessions. Independent observers used prepared data sheets to collect data. The percentage of intervals in which teacher attention was directed to each student was calculated by the following formula: The number of intervals during which attending was scored was divided by the number of intervals per session and multiplied by 100%.

Four college graduates completing a traineeship in clinical research with special child populations served as data collectors. They were instructed in behavioral coding procedures and scored practice videotapes until they reached interrater agreement percentages of 80% or above for the teacher behavior of attending.

Interrater Agreement

The percentage agreement for the occurrence and nonoccurrence of attending was calculated by determining the number of agreements divided by the number of agreements plus disagreements, multiplied by 100%. Interrater agreement was obtained for 34.7% of the sessions, distributed equally among all 3 teachers and all 15 students. The mean interrater agreement score was 93.7% (range, 72.2%

Table 1
Characteristics of Students

Small group	Student	Chronological age	Mental age	Language age	Educational classification	Problem behaviors
1	Stan	5-10	4-9	3-4	autism	inappropriate speech, out of seat
	Jamie	10-9	5-5	5-8	emotional disturbance	aggression, noncompliance, tantrums, throwing materials, whining
	Drew	8-0	3-8	3-3	emotional disturbance	aggression, noncompliance, self-stimulatory behavior, tantrums, throwing materials
2	Jason	4-11	5-9	5-1	emotional disturbance	aggression, cursing, inappropriate speech, noncompliance, property destruction, tantrums
	Kyle	6-4	5-5	4-9	emotional disturbance	aggression, noncompliance, tantrums, throwing materials
	Burt	9-9	6-7	8-6	emotional disturbance	aggression, crying, inappropriate speech, noncompliance, spitting, whining, yelling
3	Lori	11-7	1-2	untestable	autism	inappropriate sitting, leaving the room, noncompliance, out of seat, removing clothes, screaming, tantrums, throwing materials, yelling
	Brian	6-7	3-1	2-4	autism	aggression, noncompliance, screaming, self-stimulatory behavior, tantrums, yelling
	Jake	7-9	2-3	<1-0	autism	aggression, noncompliance, screaming, self-stimulatory behavior, tantrums, yelling
4	Cal	5-3	4-4	3-10	emotional disturbance	aggression, cursing, disruptive noises, leaving the room, out of seat, screaming, throwing/destroying materials, yelling
	John	5-0	3-8	4-1	autism	inappropriate speech, noncompliance, self-stimulatory behavior
	Tim	4-4	1-10	1-11	autism	aggression, crying, noncompliance, tantrums
5	Mark	3-2	1-4	untestable	autism	aggression, crying, self-injurious behavior, tantrums, throwing materials
	Sara	6-11	4-1	3-10	autism	aggression, inappropriate noises, noncompliance, screaming, self-stimulatory behavior, tantrums, throwing/destroying materials, yelling
	Kim	3-10	2-2	1-11	autism	aggression, crying, noncompliance, tantrums, throwing/destroying materials, whining

Note. Chronological, mental, and receptive language ages are expressed in years and months. Mental ages were assessed with the Slosson Intelligence Test. Receptive language ages were assessed with the Vineland Adaptive Behavior Scale.

to 100%) for occurrence and 93.6% (range, 70.0% to 100%) for nonoccurrence.

Procedure

The 15 students were placed in five groups of 3 students. We used groups for several reasons: (a) The students typically received classroom instruction in small groups, (b) we were interested in measuring the distribution of teacher attention among students, (c) we wanted to determine whether we could generate hypotheses about the problem behavior of several students at once, and (d) pre-

vious research has indicated that child effects are evident with groups of students but not with individual students (Taylor, Robinson, & Carr, 1988). Because previous research has indicated that group size and composition (i.e., the behavior problem profiles of each group member) influence these effects (Taylor & Carr, 1992; Taylor et al., 1988), we attempted to construct uniform groups of students. Group assignments were made with the stipulation that each group contain at least 1 student presumed (by the classroom teachers who nominated students for the study) to exhibit problem behavior maintained by attention and 1 student presumed to exhibit problem behavior maintained by escape.

Each teaching session lasted 15 min. Each day, each teacher conducted one session with each of the five groups, for a total of five sessions per day. Each group of students received a total of four sessions with each teacher. The teachers conducted sessions in counterbalanced order across the groups of students.

Teachers were asked to provide each student with brief periods of individual instruction within a small-group format by presenting discrete trials to 1 student in the group and then probing the other students' memory or language skills. For example, the teacher might ask 1 student, "What's the day of the week?" Once the student answered, the teacher would ask another student, "What did he [she] say?"

Teachers were instructed to avoid using behavior-management strategies that required special supplies (e.g., token systems). Teachers were told that they could use, at their discretion, procedures they typically used in their classrooms such as differential attention, verbal praise and physical contact, extinction, ignoring, and manipulating the order of task presentation or student seating arrangements. Teachers were instructed to redirect students physically if they attempted to leave the room or engaged in potentially dangerous behavior (e.g., aggression or self-injury).

Results and Discussion

Figure 1 shows the percentage of intervals of teacher attention distributed among students in each small group, collapsed across all 3 teachers. (The data from the individual teachers conformed to the patterns represented by the aggregated data. Ranges are available upon request from the authors.) The black histograms indicate the mean percentage of intervals of teacher attention, collapsed across all four teaching sessions, and show that the teachers attended differentially to the students in each group. In each group, 1 student received more teacher attention than the other 2 students, who, in turn, received more equivalent amounts of teacher attention.

The white histograms in Figure 1 show the percentage of intervals of teacher attention distributed during the first session only, and indicate that this pattern of unequal distribution of teacher attention among students occurred during the first session. For two reasons, it is unclear whether the unequal distribution of attention was established before or during the first session. First, the teachers and students were familiar with each other and had an interaction history that preceded the first experimental session. Second, child effects studies involving teachers and students who are unfamiliar with each other indicate that student problem behavior affects the way teachers distribute their attention among students during their first session (Carr et al., 1991; Taylor & Carr, 1992). To isolate these two processes, researchers may have to compare the way in which teachers who are either familiar or unfamiliar with a group of students distribute their attention among those students.

Teachers provided more attention to Jamie, Jason, Lori, Cal, and Mark than to the other students in their groups. Based on previous research (Carr et al., 1991; Taylor & Carr, 1992), we predicted that these students exhibited problem behavior maintained, in whole or in part, by attention. Teachers provided less, and more equivalent, amounts of attention to the remaining students in each small group: Stan and Drew, Kyle and Burt, Brian and Jake, John and Tim, and Sara and Kim. We predicted that these students exhibited problem behavior maintained, in whole or in part, by escape. It was plausible that other factors (e.g., sensory, tangible, or social avoidance) controlled the problem behavior of these 10 students. However, many

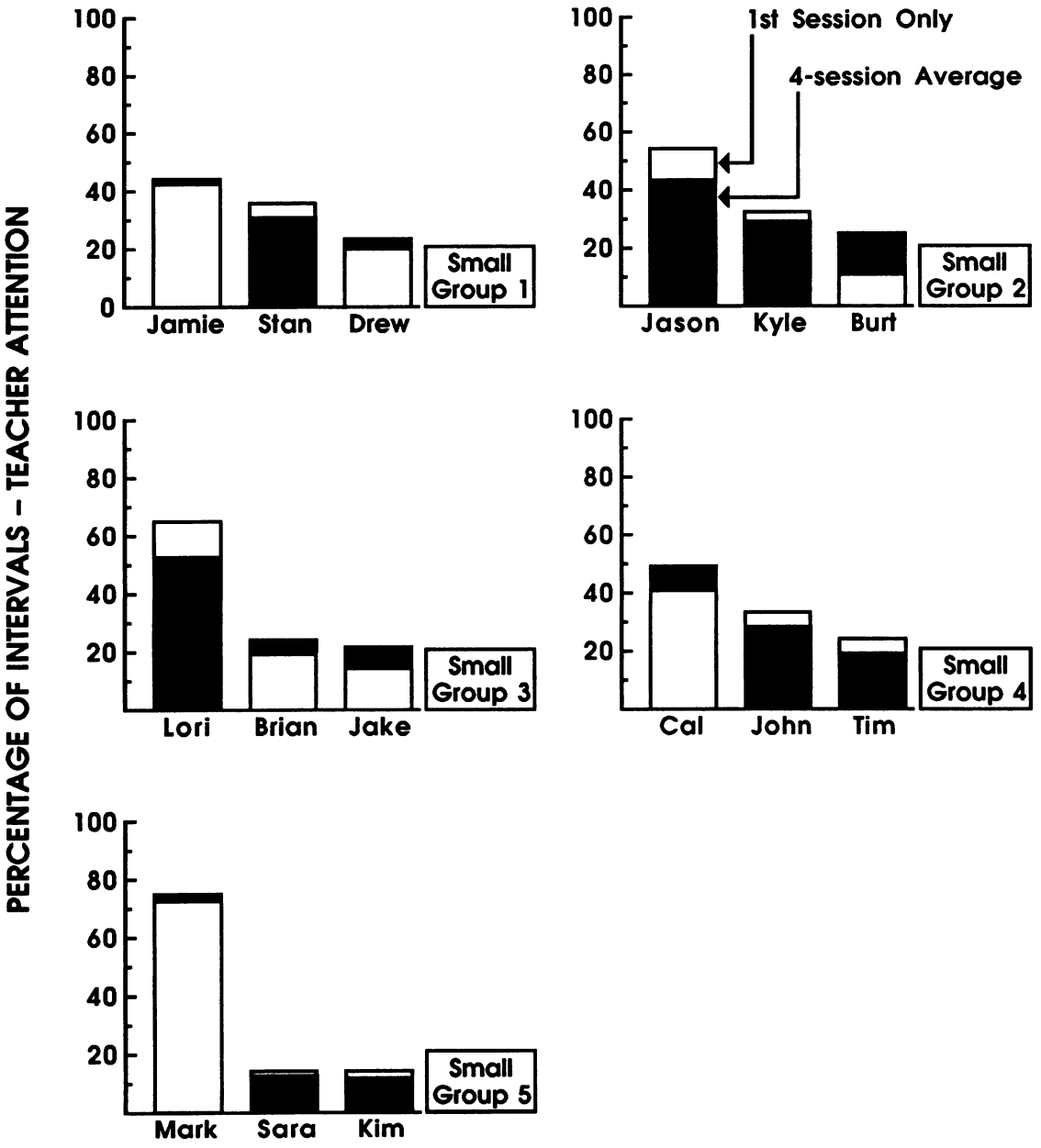

Figure 1. The percentage of intervals of teacher attention (collapsed across teachers) distributed among small groups of students averaged across all four teaching sessions (black histograms) and during the first teaching session only (white histograms).

of these students were selected because they exhibited problem behavior in instructional settings, suggesting that their problem behavior was associated with escape (e.g., Iwata, Dorsey, Slifer, Bauman, & Richman, 1982). We tested our predictions in Phase 2 by conducting brief functional analyses of each student's problem behavior.

PHASE 2: BRIEF FUNCTIONAL ANALYSIS

Method

Participants

Students. The 15 students who participated in Phase 1 were the subjects in Phase 2.

Adults. Two female staff members with extensive experience with students with emotional disturbance and developmental disabilities served as therapists. They did not participate in Phase 1 and were unfamiliar with the purpose of Phase 2. One therapist was not familiar to the students and did not have contact with them outside of this study. The second therapist was familiar to the students and had regular contact with them outside of this study.

Setting and Materials

Sessions were conducted in a small room in the students' school used for individual instruction. It contained a large table, two chairs, wall decorations, educational materials, and leisure items. The room was familiar to the students. The therapist sat next to the students at the table.

Two table-top tasks selected from each student's IEP were used. Each task was presented at a difficult level (preassessed below 50% accuracy) and at an easy level (preassessed at 80% to 100% accuracy). Tasks were presented in discrete-trial format. Examples included sorting objects by function, reading sight words, matching pictures to words, and copying shapes or letters.

Design

As described in Cooper et al. (1990), the brief functional analysis was conducted in three phases: (a) baseline, (b) initial assessment, and (c) replication assessment. The baseline served as a control condition. The initial assessment involved a multielement design across four assessment conditions in which the levels of adult attention (high and low) and task demands (easy and difficult) were varied across conditions. The order of the assessment conditions was counterbalanced across students. The replication phase involved repeating two conditions from the initial assessment: the condition in which the student displayed the lowest level of problem behavior (the "best" condition) and the condition in which the student displayed the highest level of problem behavior (the "worst" condition). Two tasks were used for each student: One task was used during the initial assessment, and the second task was used during the replication assessment.

Procedure

The procedure was based on the brief functional analysis procedure described in Cooper et al. (1990). All sessions lasted 10 min. One session was conducted in the baseline condition, in each of the four initial assessment conditions, and in each of the two replication conditions. A maximum of three sessions was conducted each day with each student. Multiple sessions conducted on the same day were separated by at least a 45-min break.

Baseline. This was similar to the free-play condition described by Iwata et al. (1982) and served as a control condition. The therapist did not place any demands on the student, allowed him or her to play with toys, and praised the student when he or she played appropriately.

Low demand, therapist ignore (LDI). The therapist presented an easy task to the student, ignored all appropriate student behavior, and verbally redirected the student following problem behavior. The therapist read the following instructions to the student before the session: "If you work on [task], I will leave you alone." During the session, the therapist sat several feet from the student, turned her back to the student, and did paperwork. She did not provide attention (verbal or gestural assistance, corrective feedback, or praise) when the student worked on the task. When the student displayed problem behavior that was not dangerous, the therapist put her paperwork down, turned to face the student, made eye contact with him or her, pointed to or tapped the task, and said "Do your work!" When the student displayed dangerous behavior, the therapist blocked the behavior and repeated the procedure described above.

Low demand, therapist attention (LDA). The therapist presented an easy task to the student, attended to all appropriate behavior, and ignored problem behavior. The therapist read the following instructions to the student before the session: "If you work on [task], I will help you." She sat next to the student, faced him or her, provided assistance with the task when needed (e.g., "Here, watch me") and corrective feedback when necessary (e.g.,

"That's not quite right, try this"), and praised the student for working appropriately and performing the task correctly (e.g., "Nice job!"). When the student displayed problem behavior that was not dangerous, the therapist ignored the student. When the student displayed dangerous behavior (i.e., aggression, property destruction, self-injury, leaving the room), the therapist nonverbally redirected the student by blocking the behavior or briefly pointing to or tapping the task. The therapist did not make eye contact with or talk to the student while doing this.

High demand, therapist ignore (HDI). The therapist presented a difficult task to the student and followed the procedure described in the LDI condition.

High demand, therapist attention (HDA). The therapist presented a difficult task to the student and followed the procedure described in the LDA condition.

Replication assessment. The "best" and "worst" conditions from the initial assessment were repeated using the task that was not used during the initial assessment.

Data Collection

Experimental sessions were videotaped. Data were scored from videotapes as described in Phase 1. Two research technicians, each with approximately 1 year of experience with interval recording, were raters. They were trained as described in Phase 1.

Student behavior. Two mutually exclusive categories of student behavior, on-task and problem behavior, were scored. *On-task behavior* was defined as actively manipulating task materials in a task-oriented manner, sitting quietly and studying task materials, asking task-related questions in an appropriate manner, and complying with the therapist's requests. *Problem behavior* included self-stimulatory behavior, noncompliance (e.g., verbally refusing requests), inappropriate speech (e.g., cursing, aggressive or lewd content), aggression, screaming or crying, throwing or destroying objects, leaving assigned seat, sitting inappropriately, temper tantrums (i.e., screaming or crying plus flailing arms or legs), and self-injury.

Procedural integrity. The amount (percentage of intervals) and type (prescribed and proscribed) of therapist attention given to each student were recorded. Attention was scored as described in Phase 1. Prescribed and proscribed statements were subcategories of therapist attention. Prescribed statements were those statements that were specified in the functional analysis for each treatment condition. Proscribed statements were those statements that were not specified in the functional analysis; these provided a measure of therapist error. Both types of statements differed across treatment conditions. In the baseline and high-attention conditions (described later), prescribed statements included positive attention (e.g., verbal and nonverbal encouragement, affirmation, or praise), task assistance or corrective feedback (e.g., "Watch me," "That's not quite right, it goes like this"), and nonverbal negative attention (redirection for problem behavior, e.g., pointing to the student's work). Proscribed statements included statements that did not fall into these three categories (e.g., questions unrelated to the task, verbal redirection). In the ignore conditions (described later), prescribed statements included verbal negative attention (e.g., "Do your work") and statements that did not fall into the previously described categories. Proscribed statements included positive attention and task assistance or corrective feedback.

The therapists provided verbal attention to students in an average of 96.2% (range, 91.7% to 100%) of the intervals per session across the baseline and high-attention conditions (LDA and HDA), and in an average of 4.1% (range, 0% to 10.2%) of intervals per session across the ignore conditions (LDI and HDI). An average of 99.4% (range, 96.9% to 100%) of the therapists' statements to the students per treatment condition were prescribed, and an average of 0.6% (range, 0% to 3.1%) of the therapists' statements per treatment condition were proscribed. These data suggest that the therapists followed the functional analysis protocol closely.

Interrater agreement. Interrater agreement was obtained for 40% of the sessions, distributed equally across all sessions and all students. Average agreement scores for the occurrence and nonoccurrence (respectively) of student behaviors were 94.3% (range, 82.7% to 100%) and 92.7% (range, 79.8% to 100%) for on-task behavior, and 91.0% (range,

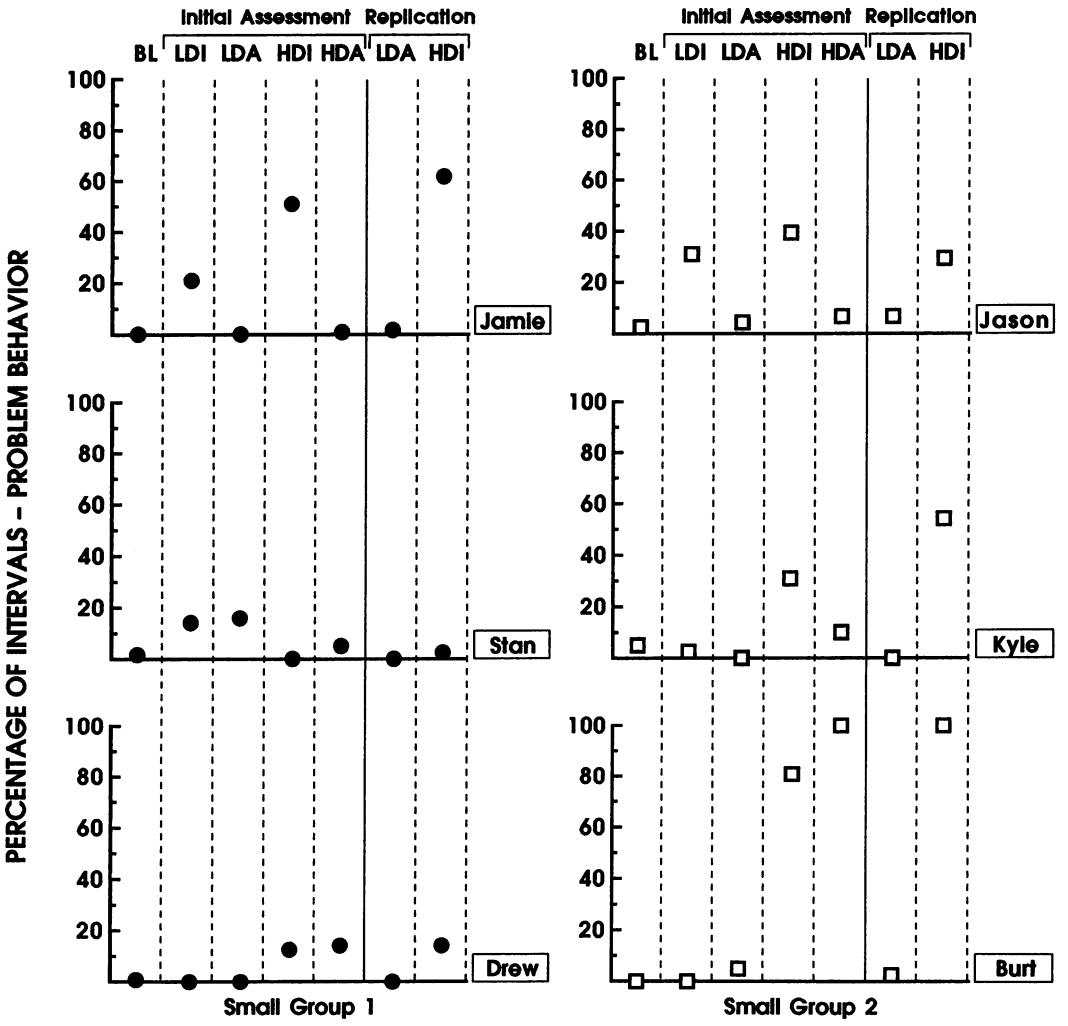

Figure 2. Performance of Small Groups 1 and 2 in the brief functional analysis.

76.8% to 100%) and 94.6% (range, 84.3% to 100%) for problem behavior. Average agreement scores for the occurrence and nonoccurrence (respectively) of therapist behaviors were 84.2% (range, 72.0% to 100%) and 87.4% (range, 78.2% to 100%) for positive attention plus task assistance or corrective feedback, and 89.6% (range, 86.4% to 100%) and 94.2% (range, 88.1% to 100%) for nonverbal and verbal negative attention.

Results and Discussion

The results of the brief functional analyses are presented in Figures 2, 3, and 4. Each figure shows the percentage of intervals of student problem behavior across baseline (BL), the four initial assessment conditions (LDI, LDA, HDI, and HDA), and the replication assessment for each small group. Although each student received the initial assessment conditions in counterbalanced order, the conditions are presented in a standardized order (LDI, LDA, HDI, and HDA) to facilitate comparisons across students.

Baseline. Most students displayed relatively low levels of problem behavior during baseline sessions; problem behavior occurred during a mean of 11.1% of the intervals (range, 0% to 66.7%). Two students displayed higher levels of problem behavior, consisting mostly of self-stimulatory behavior: Mark and John displayed problem behavior in 66.7% and 33.3% of the intervals, respectively.

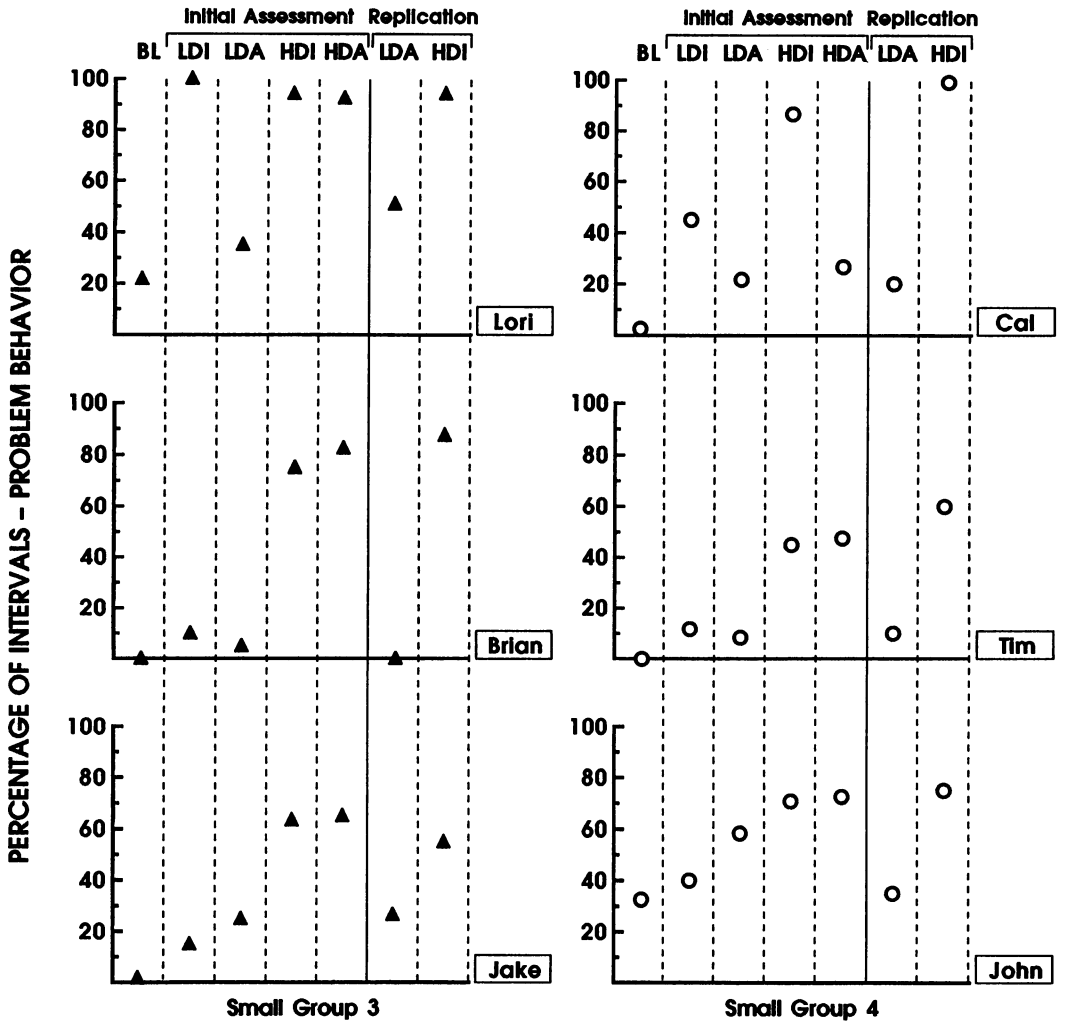

Figure 3. Performance of Small Groups 3 and 4 in the brief functional analysis.

Initial assessment. The students exhibited three general behavior patterns during the initial assessment. Jamie, Jason, Lori, Cal, and Mark exhibited the highest percentages of problem behavior during conditions involving low rates of therapist attention (LDI and HDI), suggesting that their problem behavior was maintained, in whole or in part, by adult attention. Drew, Kyle, Burt, Brian, Jake, Tim, John, Sara, and Kim exhibited the highest percentages of problem behavior during conditions involving high demands (HDI and HDA), suggesting that their problem behavior was maintained, in whole or in part, by escape from demands. Stan exhibited his highest percentages of problem behavior during conditions involving low demands (perhaps indicating boredom or an undifferentiated behavior pattern).

The students in the attention- and escape-maintained behavior categories could be divided into six behavior pattern subtypes: (a) attention, (b) attention and escape (with attention the primary factor and escape the secondary factor), (c) attention and sensory, (d) escape, (e) escape and attention (with escape the primary factor and attention the secondary factor), and (f) escape and sensory. The behavior pattern characterizing each subtype, and the students who displayed those behavior patterns, are described in Table 2.

Replication. With the exception of Stan, the students' behavior patterns exhibited in their initial assessments were duplicated in the replication assessments. For 9 students (Drew, Kyle, Burt, Brian, Cal, Tim, John, Sara, and Kim), the conditions producing the lowest and highest levels of problem behavior in the initial assessment also produced the lowest and highest levels of problem behavior in the replication assessment. For 5 students (Jamie, Jason, Lori, Jake, and Mark), similar but weaker results occurred. The conditions that produced the highest and lowest levels of problem behavior in the initial assessment produced high and low levels of problem behavior during the replication assessment but did not produce levels of problem behavior equivalent to those found in the initial assessment. The results of the replication assessment suggest that the experimental conditions (LDI, LDA, HDI, and HDA), rather than the tasks used in the initial and replication assessments, controlled the students' problem behavior.

GENERAL DISCUSSION

This study was a preliminary attempt to determine whether, by measuring the distribution of teacher attention among small groups of students with problem behavior, we could generate empirically based hypotheses about the function of students' problem behavior. In Phase 1, we determined how teachers distributed their attention among small groups of students with problem behavior. We predicted that students who received more teacher attention than the other students in their group (Jamie, Jason, Lori, Cal, and Mark) displayed problem behavior that was maintained, in whole or in part, by attention. We also predicted that the students who received less teacher attention (Stan and Drew, Kyle and Burt, Brian and Jake, John and Tim, and Sara and Kim) displayed problem behavior that was maintained, in whole or in part, by escape from demands. With the exception of Stan, these predictions were confirmed by the brief functional analyses conducted in Phase 2. Our studies suggest that measuring the distribution of teacher attention among students with problem behavior may be a valid, empirically based technique to generate hypotheses about the function of problem behavior that is maintained by attention and/or escape. These hypotheses can then be verified through experimental functional analyses, as is done with descriptive analysis (Mace & Lalli, 1991; Mace et al., 1991).

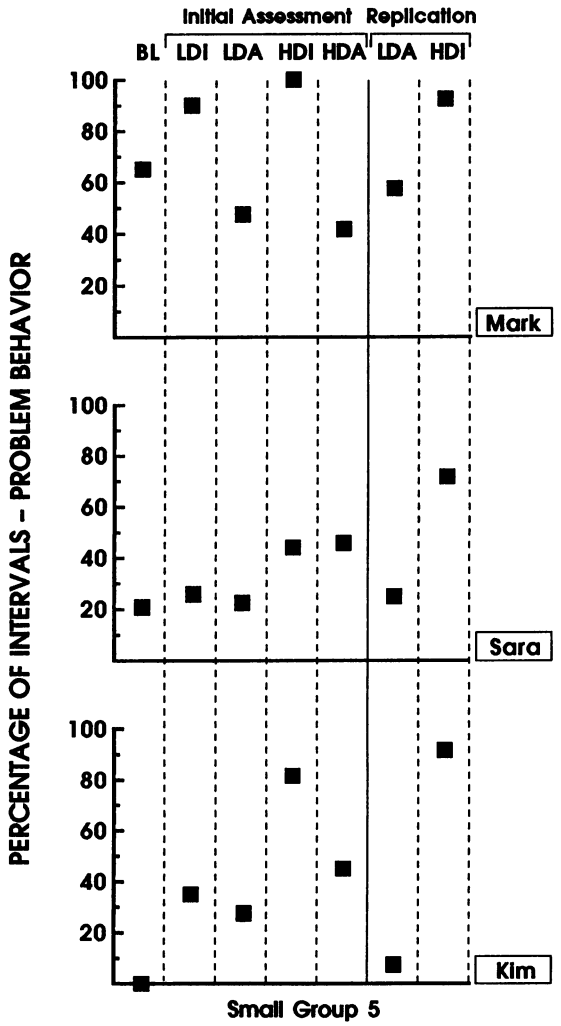

Figure 4. Performance of Small Group 5 in the brief functional analysis.

Direct observation of teacher behavior may be a relatively simple and efficient procedure that permits intervention agents to generate hypotheses about the function(s) of the problem behavior of several students at once by observing and measuring a single behavior: adult attention. Observation of

Table 2
Behavior Profile Subtypes

Behavior profile	Problem behavior pattern in initial assessment	Student (small group)
attention	low levels in BL highest levels in LDI and HDI low levels in LDA and HDA (i.e., similar to BL or between BL and LDI/HDI levels)	Jamie (1), Jason (2), Cal (4)
attention plus escape	low levels in BL highest levels in LDI and HDI high levels in HDA (i.e., between BL and LDI/HDI levels) (reflecting escape component) low levels in LDA (i.e., similar to BL or between BL and HDA levels)	Lori (3)
attention plus sensory	elevated levels in all conditions, including BL (reflecting sensory component) highest levels in LDI and HDI lower levels in LDA and HDA (i.e., similar to BL or between BL and LDI/HDI)	Mark (5)
escape	low levels in BL highest levels in HDI and HDA low levels in LDI and LDA (i.e., similar to BL or between BL and HDI/HDA levels)	Drew (1), Kyle (2), Burt (2), Brian (3), Jake (3), Tim (4), Sara (5)
escape plus attention	low levels in BL highest levels in HDI and HDA high levels in LDI (i.e., between BL and HDI/HDA levels) (reflecting attention component) low levels in LDA (i.e., similar to BL or between BL and LDI levels)	Kim (5)
escape plus sensory	elevated levels in all conditions, including BL (reflecting sensory component) highest levels in HDI and HDA lower levels in LDI and LDA (i.e., similar to BL or between BL and HDI/HDA levels)	John (4)

Note. BL = baseline, LDI = low demand ignore, LDA = low demand attention, HDI = high demand ignore, and HDA = high demand attention.

teacher attention may be easy to master, making it particularly useful in applied and community settings or with staff members or parents who lack training, technical expertise, and/or resources. In this study we observed students in groups that we created. It will be important to determine whether this hypothesis-generating technique can be used with groups of students that are typically found in applied settings, such as instructional groups in the classroom. This would increase the utility of this technique for intervention agents who work in applied and community settings.

This study is an initial investigation, and the results must be interpreted with caution. Future research must address the generality, limitations, and applications of using teacher attention as a hypothesis-generating technique. For example, the impact of contextual variables on this measure is not known. Child effects research suggests that variables such as the frequency, severity, and function

of student problem behavior, as well as the composition and size of the group of students, influence how adults distribute their attention among students (Carr et al., 1991; Taylor & Carr, 1992; Taylor et al., 1988). The students in this study displayed frequent and/or severe problem behavior. With the exception of Stan's group, groups were composed of 3 students, each with 1 member with attention-maintained problem behavior and 2 members with escape-maintained problem behavior. It is not clear whether measuring teacher attention will be a valid hypothesis-generating technique with students in larger or smaller groups, with students who have infrequent and/or mild problem behavior, with groups of students with different problem-behavior profiles (e.g., sensory or tangible) or different combinations of problem-behavior profiles (e.g., 3 students who exhibit escape behavior). For example, we do not know whether 3 students who exhibit escape behavior would receive equal or unequal amounts of teacher attention; furthermore, if they did receive unequal amounts, we would not know which variables accounted for it (e.g., severity of problem behavior, student prosocial behavior). We do not know how other variables such as setting (e.g., home vs. school or task vs. leisure; Haring & Kennedy, 1990), the instructions given to teachers (e.g., in this study, to physically redirect students who were in dangerous situations), or teachers' knowledge and use of behavior-management strategies (e.g., differential reinforcement or extinction) affect the distribution of teacher attention among students. Perhaps, for example, teachers who are experienced in behavioral theory and procedures are influenced less, or differently, by student behavior than are teachers who are not experienced in behavioral theory and procedures. In short, we do not know the multiple and complex factors that affect how adults distribute their attention among students. We must study these factors further and clarify their relationships to adult attention to determine the utility of using teacher attention to generate empirically based hypotheses about the function of student problem behavior.

In this study, attention-maintained problem behavior was identified by the amount of attention a student received. Escape-maintained problem behavior was identified by the absence of teacher attention. It is unclear, however, whether all students who received less teacher attention exhibited escape-maintained problem behavior or problem behavior maintained by *any* stimuli other than attention (e.g., sensory, tangible). For example, Steele, Robbins, Levey, and Reed (1992) found that adults paid little attention to unresponsive students who exhibited high levels of self-stimulatory behavior that presumably served a sensory function. The students selected for this study displayed problem behavior in instructional situations; it was logical to conclude that the students who received little teacher attention exhibited escape behavior. In other situations, it may be less clear how to determine whether a student who receives little teacher attention exhibits escape, sensory, or tangibly motivated problem behavior. More research is necessary to distinguish among the different problem-behavior profiles associated with little teacher attention.

In addition to teacher attention, researchers should explore using other measures of teacher behavior to generate hypotheses about the functions of student problem behavior. For example, although the way teachers distribute their attention among students may best identify students with attention-maintained or social-avoidance problem behavior, the way teachers distribute teaching trials among students may best identify students with escape-maintained problem behavior (Carr et al., 1991). Also, the way teachers distribute tangible items among students may best identify students with problem behavior that is maintained by tangible items. Researchers may have to measure several adult behaviors (attention, teaching trials, and providing access to tangible items) to generate valid, empirically based hypotheses about the various functions of student problem behavior.

The measure of problem behavior we used in this study included all topographies or forms of the students' aberrant behavior. It is likely that by using such an inclusive definition we combined problem behaviors that served different functions, perhaps introducing error variance into our results. We might have obtained "cleaner" data by focusing on a

subset of each student's problem behaviors that served the same function; however, it is likely that all forms and functions of a student's problem behavior, rather than simply a subset of problem behaviors that served the same function, affected teachers' behavior. For example, it is likely that a student's attention-maintained aggression and tantrums as well as his or her escape-maintained self-injury influence teacher behavior. This notion requires empirical investigation. Future research should also explore how other student characteristics (e.g., verbal and cognitive ability, physical appearance, sociability, and prosocial skills) moderate or mediate the impact of student problem behavior on teacher behavior.

The results of this study reveal that teachers distributed their attention unequally among groups of students with problem behavior. However, the results do not reveal the processes, mechanisms, contingencies, or variables that caused this unequal distribution. For example, we know that adults provided more attention to students whose problem behavior was maintained, in whole or in part, by attention. However, because our data on teacher attention were correlational, we do not know whether the teachers provided more attention to the attention-seeking students contingent on appropriate behavior (e.g., using differential reinforcement to promote appropriate behavior and prevent problem behavior) or contingent on problem behavior (e.g., reprimanding and redirecting a student after he or she misbehaved, thereby reinforcing problem behavior). In short, it is unclear whether teachers distributed attention among students strategically and effectively to prevent problem behavior (e.g., by using differential reinforcement) or reactively and ineffectively (e.g., by reinforcing inappropriate behavior). Collecting sequential data on adult–child interactions in future research would answer this question.

The distribution of teacher attention among students in Phase 1 predicted the function of their problem behavior, based on the brief functional analyses we conducted in Phase 2. However, we do not know whether the results of the functional analyses are valid. To determine their validity, we would have to demonstrate that a treatment program based on the putative functions of the students' problem behavior was superior to a treatment program that was not based on these functions (Crawford, Brockel, Schauss, & Miltenberger, 1992; Repp et al., 1988). Additional studies on the use of teacher attention to predict the function of student problem behavior should include a functionally derived treatment for problem behavior.

Direct observation of teachers' distribution of their attention among groups of students may provide an efficient, effective, empirically based method of generating hypotheses about the function of attention- and escape-maintained student problem behavior. Further research will determine the generality, limitations, and utility of this procedure for functional assessment.

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